UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

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SUBJECT: Carrier NPL Site Soil Clean-Up Levels

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TO: Beth Brown, Remedial Project Manager
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As requested a review has been conducted of the soil clean-up goals for the Carrier Air Conditioner Site as found in Chapter 8 of the RI. In general, the soil clean-up goals are much too lenient to be acceptable at this site. However, Carrier should note that if additional source control measures are proposed as part of the FS such as the control of contaminated water from the top of the clay lens into the Memphis Sand and aquifer clean-up of the Memphis Sand is proposed, the necessity for soil clean-up becomes primarily an economic consideration. The aforementioned remediation measures should protect the Memphis Sand as long as they are continued indefinitely, or until all ground-water contamination in excess of chemical-specific ARARs is fully remediated.

Carrier Soil Clean-Up Goals

Carrier has calculated soil clean-up goals which appear to be much too lenient for the conditions at the site. A review of the calculations indicates the following problems that contributed to the lenient results. First, the mixing zone in the Memphis Sand is calculated as the entire 500 foot depth of the formation. Such a practice is unacceptable since it is not protective of the aquifer, and since it is unreasonable to assume that complete mixing over the entire thickness of the Memphis Sands will rapidly occur. When a mixing zone is used it should consist of only the very uppermost portion of the aquifer so that the majority of the aquifer remains protected. Second, the calculations of the partition coefficient, Kd, are incorrect. Carrier unfortunately did not have site specific data on Kds so Appendix D of EPA/540/2-89/057 was used as a source for Koc values which were then converted to Kd. The correct formula for this conversion is at the top of p 130 of EPA/540/2-89/057: Kd = (Koc)(om)/1.724. Carrier left off the 1.724 resulting in higher Kd values and higher soil clean-up

levels. Third, when computing aquifer flow the cross sectional area included the entire facility rather than the specific areas where the contaminated soil are located. This again results in significantly more dilution. Fourth, the infiltration rate for the site was estimated at 0.31 feet per year. In our view, this infiltration rate is too low, and unless this value can be documented on a site-specific basis should not be used. This low rate has the effect of decreasing the amount of infiltration through the waste and decreasing the amount of contamination that partitions off in the infiltrate. Thus to summerize, a number of procedures were followed that resulted in the model being too lenient for use at this site.

Preliminary Soil Clean-Up Levels

In order to arrive at more reasonable soil clean-up levels, the model used by Carrier was used with more conservative assumptions. These assumptions included, in part, a mixing zone of fifteen feet in thickness, aquifer cross sections based on the area of the site in question, a recalculation of the Kd values based on the correct formula and an infiltration rate of 1.4 feet per year based on a water balance for the site predicated from the Memphis climatic data and information found in the Shelby County Soil Survey for the site.

The following preliminary values for soil clean-up were calculated:

	Plant Area	Lagoon Area
trichloroethylene	0.82 ug/kg	0.995 ug/kg
1,2-dichloroethene	5.3 ug/kg	6.47 ug/kg
vinyl chloride	0.02 ug/kg	0.025 ug/kg.

To summarize the soil clean-up values calculated by Carrier are too lenient because they are based on assumptions that are unreasonable for the site. If economic considerations indicate that soil clean-up is necessary to limit the time for remediation , soil clean-up levels should be recalculated. Preliminary soil clean-up values based on conservative assumptions are provided. In our view, however, if active ground-water remediation is pursued at this site such that the ground-water pathway is fully protected, soil clean-up levels based on economic or practicability considerations may be acceptable.

Hopefully, this review of soil clean-up goals will be useful. If there are any additional questions, please contact me at x3866.